12 December 1958

MEMORANDUM FOR: [redacted] 25X1

SUBJECT : Status of Granger Jammer Project

[redacted] Granger Chief Engineer and [redacted] engineer in this 25X1
project, have made four suggestions for improvement of the existing box. The first three of these suggestions required only a few days to make on a temporary basis and only a matter of a week or two on a permanent basis should tests show that the produce a significant improvement.

These three changes are: (A) Insure the 180° phase reversal of 25 YEAR RE-REVIEW
receiving modulation (at present this has varied some 10-20° which was thought satisfactory in the early design but by correcting the 10-20° phase error we can obtain an effective power improvement of 5 db); (B) Increase the amplification of the receiver circuitry (this is now possible since the antenna isolation problem has turned out to be less severe on the aircraft than had existed in the mock-up. An improvement of 10 db. is obtained on this point which for long ranges, i.e., 6-12 miles, will amount to a full 10 db increase in power output. At shorter ranges, (we don't know yet what we mean by shorter, that is; 2, 3, 5, ?) this effect will be lost due to saturation of the one watt output tube; (C) Remove the automatic gain control in the receiver (this control's purpose is to avoid the saturation of the one watt tube mentioned in (B) above. It is obviously not needed at long ranges and at present we do not know at what range will be needed. Its removal will add something to the output perhaps 2 to 5 db). This AGC must be put back in a new form in order to give close range results but this is included in the few weeks for permanent changes mentioned above). The total effect of these three changes is to increase the power output at long ranges by a minimum of 10 and perhaps as much as 20 db, i.e., 15 db can be expected. In other words, an improvement of 10-100 times the effective power output at long ranges. [redacted] has made 25X1
these changes during the week of December 1 and [redacted] is currently involved 25X1
in running tests at Mugu to evaluate these changes. First test results (i.e., the pilot's subjective comments), indicate that a significant improvement has been made.

[redacted] fourth suggestion was to install a range deception principle 25X1
which in effect causes the attacking aircraft to believe that his target is at the wrong range. Such a concept would give only temporary aid to our problem it seems, since the effect is to confuse the pilot as to which of his radar blips, that is; the skin of the target or the jammer box, is the proper blip for him to attack. If he chose the improper one it would be much easier to break his lock but should he be a smart pilot or should he have time to try both blips, he would still succeed - in fact, success would be easier. It seems to me that he would soon decide which was the proper target and having made this decision all our efforts to confuse would be in vain. This situation is quite similar to that of

using chaff; that is, faulty azimuth, elevation and range data will be created should the attacking aircraft follow the chaff but the possibility still exists with radar and a smart pilot of finding the skin echo and overcoming completely the deceptive effects. This change, if approved, would be a major one to the existing box and would require a period of months to build one. [redacted] has not been authorized to proceed. 25X1

[redacted] suggests that circuitry might be installed to cycle the jammer on and off in such a way as to favor completely unlocking the attacking aircraft. This change would require some doing, perhaps 30 days of time and has not been authorized since the on-off test procedures which would indicate its probable success or failure have not yet been tested out at Pt. Mugu. 25X1

After discussing the need for addition power which is the basic problem of the jammer and the most obvious direct solution for a complete break lock effect, it is judged by the three of us, [redacted] and myself, that we should not consider a 10 watt tube but should go to a 50 watt federal tube or a 1,000 watt tube. In pursuing this line a bit further, it is requested that Major Hippert investigate for me the following questions: 25X1

a. Has Sanders Associates of Nassau, New Hampshire carried out any work on X-band jammers? This would probably be work done for the Navy through Cdr. Holcomb of BuAir, Avionics Div. The last reading that I had, was that their work was entirely on S-band.

b. Investigate through WADC the jammer program for B-58 being carried on by Sylvania Corporation, Waltham, Mass. to see if they have any X-band equipment or experience. I have no knowledge of their present status.

c. To determine from Mr. Cosby of NRL if he has any operational test results beyond those in his publication entitled, "The ALQ-H(X) Countermeasures System, dated July 16, 1958, NRL #5157. The latter question has been raised already through [redacted] 25X1
of [redacted] office, but your assistance in expediting the d 25X1
would be much appreciated.

[redacted] 25X1

Distribution:

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